

CLAIMS

1. A beam source comprising:

a discharge tube;

5 a gas inlet for introducing gas into the discharge tube;

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three electrodes mounted in the discharge tube downstream
from the gas inlet, wherein the electrode on the upstream end
has a plurality of openings through which the gas can pass, the
middle electrode is a mesh-shaped electrode, and the electrode
10 on the downstream end is a beam-emitting electrode having a
plurality of beam-emitting holes and is disposed in a plane
parallel to the middle electrode;

plasma-generating means disposed between the two upstream
electrodes on the outside of the discharge tube for transforming
15 gas introduced into the discharge tube into plasma; and

voltage-applying means for accelerating the beam between
the two downstream electrodes and emitting the accelerated beam
from the downstream beam-emitting electrode.

20 2. A beam source as claimed in claim 1, wherein the two
electrodes on the upstream end have the same potential, while
the beam-emitting electrode on the downstream end has the same
potential as that of a chamber into which the beam is emitted.

25 3. A beam source as claimed in claim 1, wherein the two
electrodes on the downstream end are separated by a distance of
5 millimeters or greater, and preferably by a distance of 10-30
millimeters.

4. A beam source as claimed in claim 1, wherein each of the beam-emitting holes formed in the beam-emitting electrode on the downstream end has a length-to-diameter ratio of 2 or greater.

5. A beam source as claimed in claim 1, wherein the voltage-applying means applies a positive-negative pulse-type voltage that alternately irradiates either positive ions and negative ions or positive ions and electrons.

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